NEMOSHIP

WP2 - Multi-layer digital platform development and implementation

D2.6: Digital twins for use cases : Virtual demonstrations - Public Summary:

The ambition of the NEMOSHIP project is to develop, test and demonstrate innovative technologies, methodologies and guidelines to accelerate large BESS deployment and optimal exploitation toward 2030 on both hybrid and fully electric configurations. To help achieve this ambition, NEMOSHIP will develop a 1 MWh modular and standardised battery energy storage solution that is able to exploit heterogeneous storage units and a cloud-based digital platform to enable data-driven, optimised and safe exploitation. The project will demonstrate the maturity of these innovations at TRL 7 for hybrid ships as well as their adaptability towards fully electric ships.

The present deliverable is part of WP2 which focuses on the NEMOSHIP digital platform development and implementation. This WP includes the development of digital twins for each of the NEMOSHIP use cases, namely an offshore vessel from Solstad, a cruise vessel from Ponant and two semi-virtual full electric use cases. Simulation in the context of the NEMOSHIP project involves the creation of detailed, dynamic models that replicate the behavior of vessel energy systems under various conditions. These simulations are essential for predicting performance, identifying potential issues, and optimizing operations without the risks and costs associated with physical testing.

By involving advanced simulation tools and techniques, the digital twin can emulate the complexities of hybrid ship configurations, including aspects such as energy storage, distribution, and consumption.

This document describes the digital twin modelling for the two NEMOSHIP virtual use cases on large passenger ferries, i.e. a full electric ferry with 100 Nm autonomy and a hybrid ferry (batteries and fuel cells) with 300 Nm autonomy. The specifications, requirements, design and electrical architecture for the virtual use cases ships have been defined considering actual load profile data. The modelling has been performed using models from the Simcenter Amesim marine library from partner Siemens Digital Industry Software (SISW), fed with relevant generic data for system validation and optimization. The electrical architecture and modelling will be further developed in the frame of WP7 together with the semi-virtual evaluation.

First, the virtual use cases of full electric ferry with 100 Nm autonomy and hybrid ferry with 300 Nm are detailed, considering ship design, electrical architecture and load profile. The modelling methodology and linked components models considered are described in the subsequent section.

Finally, the modelling and simulation results are presented for both use cases.

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